WHAT IS CLAIMED IS:

1. A displacement pickup comprising:

a first reading means for emitting a beam of light to diffraction gratings and reading a return component of light from the diffraction gratings;

a first phase detecting means for detecting a first phase on the basis of the return component of light detected by the first reading means;

a second reading means for emitting a beam of light to diffraction gratings and reading a return component of light from the diffraction gratings;

a second phase detecting means for detecting a second phase on the basis of the return component of light detected by the second reading means;

a phase comparing means for making a comparison between the first and second phases;

an origin signal generating means for producing an origin signal on the basis of the result of comparison from the phase comparing means; and

a scale having defined thereon a first area in which diffraction gratings are recorded with a predetermined pitch and from which the return component of light from the diffraction gratings is read by the first reading means, and a second area in which diffraction gratings are recorded at a predetermined pitch different from the diffraction grating pitch in the first area and from which the return component of light from the diffraction gratings is read by the second reading means, the scale being displaceable in a direction in which the return component of light from the diffraction

gratings is read by the first and second reading means,

the first and second areas being defined on the scale to be displaceable an equal distance in the same measuring direction; and

a position for reading, by the first reading means, the positional information recorded in the first area and a position for reading, by the second reading means, the positional information recorded in the second area being in line with each other in the measuring direction.

2. The apparatus as set forth in claim 1, wherein the scale has a first area defined on one of ends thereof in a direction in which the positional information is read by the first and second reading means, and a second area defined at the other end.

3. The apparatus as set forth in claim 1, wherein the scale has second areas defined thereon across a first area.

4. The apparatus as set forth in claim 1, wherein the scale has first and second areas defined in stack perpendicularly to a direction in which the positional information is read by the first and second reading means.

5. The apparatus as set forth in claim 1, wherein the origin signal generating means includes a setting means for setting an arbitrary value so that the origin signal generating means will produce an origin signal when a difference between the first and second phases takes the arbitrary value.

6. The apparatus as set forth in claim 1, wherein the origin signal generating means produces an origin signal only when a difference between the first and second

phases is zero.

7. The apparatus as set forth in claim 1, wherein the origin signal generating means produces an origin signal when a difference between the first and second phases has taken a set value a predetermined number of times.

8. The apparatus as set forth in claim 1, further comprising:

a selecting means for selecting either the first or second phase; and

a setting means for setting an arbitrary value so that the origin signal generating means will produce an origin signal when any of the phases selected by the selecting means takes the arbitrary value after a difference between the first and second phases takes a set arbitrary value.

9. The apparatus as set forth in claim 8, wherein the origin signal generating means produces an origin signal when the phase selected by the selecting means takes a value set by the setting means in a position after the difference between the first and second phases takes a set value and then the phase difference takes the set value which appears again in a position a predetermined distance apart from the above position.

10. The apparatus as set forth in claim 9, wherein:

the predetermined distance is $(2n + 1)\Lambda/2$ where $\underline{n}$ is an integer larger than zero and Λ is a pitch with which the diffraction gratings are recorded in the first area in case the first phase difference is selected by the selecting means, while being a pitch with which the diffraction gratings are recorded in the second area in case the second phase difference is selected by the selecting means.

11. The apparatus as set forth in claim 1, wherein:

the positional information recorded in the first and second areas defined on the scale includes transparent or reflective diffraction gratings;

the first reading means includes a first light source, a first beam splitting means for dividing a light beam from the first light source by two, and a first optical system in which the two divisional light beams are diffracted by the diffraction gratings and the two diffracted light beams are superposed on each other to provide an electric signal; and

the second reading means includes a second light source, a second beam splitting means for dividing a light beam from the second light source by two, and a second optical system in which the two divisional light beams are diffracted by the diffraction gratings and the two diffracted light beams are superposed on each other to provide an electric signal.

12. The apparatus as set forth in claim 11, wherein:

the first reading means further includes a first reflector to reflect the two divisional light beams diffracted by the diffraction gratings back to the diffraction gratings;

the second reading means further includes a second reflector to reflect the two divisional light beams diffracted by the diffraction gratings back to the diffraction gratings;

the first optical system superposes the diffracted light beams having been

diffracted by the diffraction gratings several times; and

the second optical system superposes the diffracted light beams having been diffracted by the diffraction gratings several times.

13. The apparatus as set forth in claim 12, wherein the coherence lengths of the first and second coherent light sources is within 200 μm.

14. The apparatus as set forth in claim 12, further comprising:

a first modulation degree detecting means for detecting a degree of modulation when the two diffracted light beams are caused to interfere with each other in the first optical system;

a first monitoring means for monitoring the change of optical path length difference on the basis of the result of detection from the first modulation degree detecting means;

a second modulation degree detecting means for detecting a degree of modulation when the two diffracted light beams are caused to interfere with each other in the second optical system; and

a second monitoring means for monitoring the change of optical path length difference on the basis of the result of detection from the second modulation degree detecting means.

15. The apparatus as set forth in claim 11, wherein:

the scale is a one having a first area defined thereon and second areas defined thereon on either side of the first area or a one having a first area and second area

defined in stack perpendicularly to a direction in which positional information is read by the first and second reading means; and

the optical paths along which the diffracted light beams superposed by the first optical system travel are disposed centrosymmetrically with each other with respect to a direction in which the scale is displaced.

16. The apparatus as set forth in claim 11, wherein:

the first optical system further includes a first adjuster for a maximum ratio of modulation; and

the second optical system further includes a second adjuster for a maximum ratio of modulation.

17. The apparatus as set forth in claim 11, wherein one light source is used in common as the first and second light sources.

18. The apparatus as set forth in claim 11, wherein:

the scale is a one having a first area defined thereon and second areas defined thereon on either side of the first area or a one having a first area and second area defined in stack perpendicularly to a direction in which positional information is read by the first and second reading means;

one light source is used in common as the first and second light sources; and

one beam splitter is used in common as the first and second beam splitters.

19. The apparatus as set forth in claim 11, wherein

the first light source is connected to the first beam splitter with an optical fiber

through which the light beam is guided for incidence upon the first beam splitter;

the first beam splitter is connected to the first optical system with an optical fiber through which the light beam is guided for incidence upon the first optical system;

the second light source is connected to the second beam splitter with an optical fiber through which the light beam is guided for incidence upon the second beam splitter; and

the second beam splitter is connected to the second optical system with an optical fiber through which the light beam is guided for incidence upon the second optical system.

20. The apparatus as set forth in claim 19, wherein the first and light sources, and the first and second optical systems are provided outside the apparatus.

21. The apparatus as set forth in claim 11, wherein

the first light source is connected to the first beam splitter with an optical fiber through which the light beam is guided for incidence upon the first beam splitter;

a photodetector in the first optical system is connected to each of other components of the first optical system with an optical fiber through which the light beam is guided for incidence upon the other components;

the second light source is connected to the second beam splitter with an optical fiber through which the light beam is guided for incidence upon the second beam splitter; and

a photodetector in the second optical system is connected to each of other components of the second optical system with an optical fiber through which the light beam is guided for incidence upon the other components;

22. The apparatus as set forth in claim 21, wherein the first and light sources, and the photodetectors in the first and second optical systems are provided outside the apparatus.